

**National Shipbuilding Research Program  
SNAME Panel SP-I  
Facilities and Environmental Effects**

# **Evaluation of Toxic Air Emissions**

**June, 1995**

**prepared and submitted by:**

**National Steel and shipbuilding CO.  
San Diego, California**

**Project 1-92-1**

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# TABLE OF CONTENTS

	Page
FOREWORD.....	i
EXECUTIVE SUMMARY.....	1
1. INTRODUCTION....	3
2. PROJECT OVERVIEW.....	5
3. SHIPYARD SURVEYS.....	8
4. REGULATORY OVERVIEW	
5. EMISSIONS DATABASE DEVELOPMENT.....	13
6. REFERENCES .....	15
APPENDIX A: Sample Shipyard Survey	
APPENDIX B: Shipyard Survey Results	
APPENDIX C: Emissions Database User's Manual	
APPENDIX D: Legal Overview of Clean Air Act Amendments	
APPENDIX E: List of Hazardous Air Pollutants	

# FOREWORD

This research project was produced for the National Shipbuilding Research Program (NSRP) as a cooperative cost-shared effort between the U.S. Navy and National Steel and Shipbuilding Co. (NASSCO) of San Diego, California. The Facilities and Environmental Effects Panel (SP-1) of SNAME'S Ship Production Committee sponsored the project.

The research was conducted and this final project report was prepared by NASSCO. NASSCO participants included Dan Buell as Project Manager and Willie Gaters as Project Engineer. Project development included input from Bill Guerry, Esq. of the legal firm of Collier, Shannon, Rill & Scott, who prepared the legal overview; the consultant firm of OP&L, who developed the database; Les Hansen, an independent engineering consultant in San Diego, who edited the final report; and Zach Jacobs, an independent engineering consultant in San Diego, who completed the sub-project on the characterization and control of welding fume emissions.

The project team acknowledges and appreciates the assistance and efforts of the following shipyards and their representatives:

Fletcher Hunt of the Port of Portland Ship Repair Yard

Walter Botts of West State, inc.

Dave Donaldson of Cascade General, Inc.

## EXECUTIVE SUMMARY

The 1990 amendments to the Clean Air Act (CAAA) mandate strict control and monitoring of industrial sources of various potential air pollutants. Shipyards are included in the group of industries coming under recent scrutiny by regulatory agencies. In addition to federal regulations, many states and localities have begun to develop their own, often more aggressive, air pollution programs, particularly in the area of air toxics. The extent of the impact of these regulations will depend primarily on the size and location of the individual shipyard.

Initially, this project focused on the federal regulation concerning HAPs emitted from shipyards pursuant to Title III of the CAAA, but was expanded to include criteria pollutants and the potential of utilizing the data and developments of the project for Title V requirements, which apply to Federal air permits. Typical operations at shipyards that emit regulated pollutants include coating, degreasing, electroplating, welding, and abrasive blasting. Solvents used by shipyards in coating operations emit hazardous air pollutants in the form of volatile organic compounds (VOCs). The

EPA is required to regulate VOC emissions from coatings under the CAAA.

The primary deliverable of the project was the development of a procedure, format, and database for identifying, characterizing, and quantifying Hazardous Air Pollutants (HAPs) and criteria pollutants (NOX, SOx, VOC, PM10, CO, and Lead) emitted from various shipyard processes and equipment. An integral part of this effort was the development of a user-friendly and shipyard compatible database. The database inventories, characterizes, and quantifies the above regulated air contaminants from equipment and processes, and provides feasible, proven, and Environmental Protection Agency (EPA) approved control technologies for the various pollutants. The database, which was designed by an outside consulting firm, is a PARADOX based application software package identified as "KETBase".

This project report and developed software will provide an overview of the typical air emission sources and levels of emissions of HAPs at shipyard facilities. This information will assist individual shipyards to develop cost-effective and

acceptable plans to comply with applicable federal standards for regulated HAPs as well as any additional limitations on the content of VOCs in marine coatings. The techniques, procedures, and software developed in this project can effectively be utilized for future Title V permitting application processes.

# 1. INTRODUCTION

Over the past decade, air releases from shipyards and repair facilities have come under increased scrutiny from regulatory agencies and the public. A variety of federal, state and local laws have been enacted to limit the releases, driven primarily by the federal Clean Air Act Amendments (CAAA) of 1990. A few states have developed comprehensive air toxic regulations, however, most shipyards are in states that do not yet have such regulations.

Requirements imposed by the various Titles, specifically Title III and V, of the CAAA warrant the need for facilities, including shipyards, to maintain detailed inventories and monitor operations emitting regulated air pollutants. These regulated processes include many common shipbuilding activities, such as welding, surface preparation and coating, plating, and the operation of combustion equipment (generators, compressors and engines). Emission inventories must provide accurate profiles of a facility's current operations and future planned operations (5 year window) for complying with permitting requirements and potential operational constraints as established by a Title V Federal permit.

Under Title V of the CAAA, a facility emitting regulated pollutants in excess of federally enforceable trigger levels must develop and obtain a Title V facility operating air permit. Hazardous Air Pollutants (HAPs) as defined in Title III of the CAAA will have to be addressed in the permitting process. The list of HAPs is extensive (currently about 200) and contains many chemicals commonly found in shipbuilding. Once approved, this permit, in conjunction with any existing state or local permits, will dictate a facility's operating limits and parameters based on associated emissions from the permitted devices or operations. Therefore, detailed and thoughtful development of this permit is imperative to avoid the imposition of restrictive operating limits and requirements. Such limits could lead to the curtailing of production operations.

A well-developed permit will reflect representative current operating parameters and limitations as well as allow for flexibility for future growth and operating needs. Careful corporate planning, which should consider operational modes in the past, current, and future as well as associated business and backlog conditions, will aid in development of "facility friendly" Federal Title V operating permit. The informa-

tion provided in this report is intended to assist shipyards in developing such a permit.



## 2. PROJECT OVERVIEW

The original objectives of this project were:

- ◆ Characterize the regulated hazardous air pollutants (HAPs) typically emitted from shipyard facilities.
- ◆ Develop a database and an analysis of available cost-effective air toxic control strategies and practices which may become adopted in future regulatory requirements applicable to the industry.
- ◆ Provide information in support of comments to the EPA on proposed air toxic regulations applicable to shipyards.

As the implementation of the project progressed, it became obvious that a slightly different approach was necessary. The following new objectives were addressed:

- ◆ Characterize and quantify the regulated hazardous air pollutants (HAPs) and criteria pollutants typically emitted from shipyard processes.

- ◆ Develop a database to characterize, quantify, and identify HAPs and criteria pollutants as well as applicable EPA approved and proven control technologies.

One important factor influenced the decision to modify the approach of the initial scope of this project. By the time the project was approved and funding became available, the EPA had established the regulatory requirements for HAPs and potential control strategies and options had been identified. At this point, it was decided that the focus should be on establishing a mechanism for shipyard facilities to perform a complete site air emissions inventory and quantification. A database was developed to effectively fulfill this requirement to enable the site to support regulatory reporting and permitting needs. The information maintained on the database could serve as a baseline for the Title V permitting process.

The project accomplished several key tasks as summarized below:

- ◆ A project team comprised of National Steel and Shipbuilding Co. (NASSCO), the legal firm of Col-

lier, Shannon, Rill, & Scott, and the consulting firm of OP&L was established.

- ◆ NASSCO and OP&L developed and distributed to representative shipyards a facility survey which would identify the existing shipyard production processes, the associated regulated air pollutant emitting devices and processes, and the software and hardware computer capabilities of the yard.
- ◆ Collier, Shannon, Rill & Scott conducted an overview of the regulatory issues applicable to shipyards as identified in the Clean Air Act Amendments (CAAA), specifically Titles III & V.
- ◆ A device and process identification and location matrix for site air emission characteristics was developed and utilized by NASSCO and OP&L for the walk-throughs of representative shipyard sites selected from the evaluation of the shipyard survey responses.
- ◆ As a result of the information gathered from the surveys and walk-throughs, an air pollutant emissions inventory database which

includes emission identification, characterization, quantification, and potential applicable control technology for regulated pollutants was developed.

- ◆ NASSCO, with OP&L assistance, evaluated database capabilities and usage potential with an on-site pilot program.
- ◆ NASSCO and OP&L distributed copies of the database manual and operating disc to representative shipyards at a NSRP meeting.
- ◆ NASSCO summarized the project findings in this final report.

The primary benefit expected from the implementation of the database developed in this project is the ability of a shipyard to identify, characterize, and quantify **all** regulated air pollutant emission sources within their facility boundaries. This will enable sites to effectively prepare for the potential submittals of the applicable Title V (Federal) facility permit.

One of the potential project benefits described in the original abstract included the development of data which could be used to support a petition to delist certain specific air toxins in the shipbuilding and

repair industry. During the completion of this project, it was found that the process of delisting is cumbersome, expensive, time consuming, and has a low success rate. This potential benefit was abandoned and the project monies were utilized for a more cost-effective effort, the further refinement and development of the database.

As a related sub-task to this project, shipyard welding processes were studied and characterized for potential Hazardous Air Pollutants (HAPs) emissions. This specific task was not included in the original project scope, but was added due to the significance of welding as a shipbuilding operation. Suggested control methods and technologies are discussed and presented with the associated advantages and limitations of each alternative. This report, entitled Characterizing Shipyard Welding Emissions and Associated Control Options, will be distributed under separate cover in mid-1995 (NSRP# 0442).

### 3. SHIPYARD SURVEYS

A survey (Appendix A) for shipyard site air pollutant emissions sources was distributed to NSRP member shipbuilder and repair yards. Table B1 (Appendix B) shows a list of shipyards that were contacted to participate in the survey. Survey results are summarized in Table B2 (Appendix B). Based on the returned surveys, representative shipyards were selected for site visitations. Selection was based on a shipyards location, and new construction/repair capabilities. From the site visitations, a master list of characteristic air pollutant emission sources was established for atypical shipyard environment. Typical source categories include Welding, Blasting, Coating Operations, Degreasers, Plating Processes, and Combustion Operations (i.e., Boilers, Generators, Compressors, and Cranes). The collected information was evaluated and utilized to develop the emissions inventory database.

Facility walk-throughs were performed by a NASSCO team member and an OP&L representative. Air pollutant emission source characteristics were conducted at NASSCO (National Steel & Shipbuilding Co.) in San Diego, CA and Port of Port-

land yard in Portland, Oregon. NASSCO was selected for its location, process diversity, emission source variability, and new construction and ship repair activities. Port of Portland (PoP) ship repair yard hosts two shipbuilding and repair tenants; Cascade General, Inc. and West State, Inc. PoP was selected because of its diversity of operations. Both entities conduct significant ship repair work.

Using traditional EPA, state, and local regulatory source designations and typical shipyard process identifications, all air pollution emitting processes and devices were identified and characterized during the site visits. General raw material characteristics and usages were recorded as well as data regarding equipment operation and pertinent equipment specifications. Similar operations were grouped to simplify emissions quantification and control technology evaluation.

Based on the information obtained in the questionnaire and the site visitations, basic equipment and process categories were created as follows:

◆ Welding

- ◆ Abrasive Blasting
- ◆ Coating Operations
- ◆ Fuel Storage and Dispensing Operations
- ◆ Plating Operations
- ◆ Decreasing Operations
- ◆ Adhesive Application
- ◆ Plastic Layup
- ◆ Plastic Machining
- ◆ Combustion Sources

The above emission source categories were utilized to establish the process identification module of the project-developed database.

## 4. REGULATORY (LEGAL) OVERVIEW

The legal firm of Collier, Shannon, Rill & Scott, as a member of the project team, developed a regulatory overview document that details the law, the Clean Air Act Amendments (CAAA), and the regulatory response to the law that will affect shipyard activities. Specifically, the details and impacts of Title III (Hazardous Air Pollutants) and Title V (Federal Air Facility Permits) are addressed in this dissertation. Appendix D presents the complete document. The following paragraphs summarize the highlights of the overview.

In 1970, Congress enacted section 112 of the Clean Air Act, which directed EPA to list and then adopt health-based National Emission Standards for Hazardous Air Pollutants (NESHAPs) that “provide an ample margin of safety”. Between 1970 and 1990, EPA established emission standards for only the following six hazardous air pollutants: asbestos, beryllium, mercury, benzene, radionuclides and arsenic. The EPA’s inability to list and regulate additional HAPs largely stemmed from the difficulty of establishing defensible “acceptable risk” levels for carcinogens.

Congress designed Title 111 of the CAAA to address the prior failure of the NESHAP program by: (1) establishing a statutory list of 189 regulated HAPs; (2) requiring EPA to initially develop technology-based emission standards on a source category basis, rather than on an individual pollutant basis; and (3) requiring EPA to conduct a subsequent “risk assessment” and to issue more stringent health-based standards if necessary to provide “an ample margin of safety”.

Section 112(c) of the CAAA requires the EPA to designate and regulate industrial source categories that contain either “major sources” or “area sources” that emit any of 189 listed HAPs. The EPA may add to the list of regulated HAPs those substances which present a threat of adverse human health effects or adverse environmental risks. Section 112(a) of the CAAA defines the term “major source” to include any stationary source or group of stationary sources that emits or has the “potential to emit” 10 tons per year or more of any listed hazardous air pollutant or 25 tons per year or more of any combination of listed HAPs. A single facility or plant may contain multi-

ple-regulated “major sources”. “Area sources” are those sources that the EPA determines still pose a significant health risk even though their emissions do not trigger the “major source” thresholds. In December 1993, EPA published a final list which contained approximately 165 regulated “major sources” and 8 “area sources” of HAPs and set forth a promulgation schedule for future regulations.

Section 112(d) of the CAAA requires HAP standards for “major sources” to require the “maximum achievable control technology” (MACT) taking into account compliance costs, health and environmental impacts, and energy requirements. The maximum degree of reduction in emissions can be achieved through a variety of measures, processes, methods, systems, or techniques, including design or operational changes. EPA may elect to promulgate alternative standards for “area sources” that provide for the use of “generally available control technologies” or management practices in lieu of MACT. The individual pieces of equipment, process, production units, or emission points that will be subject to HAP regulation will be defined and determined in the individual regulations establishing applicable MACT standards.

Section 112(j) sets forth specific “ham-

mer” provisions that are automatically triggered if EPA misses a MACT promulgation date for a listed category of major sources by more than 18 months. Under a court order, EPA must promulgate, by November 1995, MACT standards for coatings used by shipyards. As long as EPA complies with that order, shipyards will not have to incur the substantial additional expense associated with filing a permit application for a case-by-case MACT determination for coatings under section 112(j). After the effective date of any emission standard or state permit program pursuant to Title V, no person may construct any new “major source” or modify any existing “major source” unless the permitting authority determines that the new source will comply with the applicable MACT standard.

Approximately 30 states that contain metropolitan areas that have failed to attain the ambient air quality level for ozone must submit State Implementation Plans (SIPs) that demonstrate those states will attain the ozone standard in a timely manner. The CAAA requires those states to impose reasonably available control technology (RACT) requirements on “major sources” of volatile organic compounds (VOCs). The threshold “major source” levels depends on the severity of ozone pollution in a particular air basin.

The CAAA required EPA to establish by November 1993, control techniques guidelines (CTGs) to reduce the emissions of volatile organic compounds (VOCs) and PM-10 from coatings and solvents used in shipbuilding and repair operations. These CTGS must identify "best available control measures" (BACM) for the industry. EPA interprets BACM as being roughly equivalent to RACT.

Under section 502(d), all states were required to develop and submit by November 15, 1993, a proposed federal air permit program that contained at a minimum specific provisions mandated by EPA pursuant to Title V of the CAAA. However, as of March 1994, only about half of the States had submitted a complete Title V permitting program. States face stiff sanctions if they fail to file a complete proposed Title V permit program by May 1995. Facilities designated as a "major source" (including those that emit regulated HAPs or VOCs) will have to submit a comprehensive permit application within 12 months of becoming subject to an EPA authorized permit program (generally sometime in late 1995 or early 1996). These permit applications will have to quantify the emissions of all regulated air pollutants emitted from a "major source" facility and identify all applicable emission standards.



## 5. EMISSIONS DATABASE DEVELOPMENT

One of the goals of this project was to develop a database that would identify, characterize and quantify potential regulated pollutant emissions and control options for various typical shipyard processes and air pollutant emitting devices. The database, which was developed by the consulting firm of OP&L, is a Paradox based application software package identified as "**KETBase**". It has a stand-alone user interface that includes modules with pull-down and help menus, which are independent from the Paradox functions. The user initiates the **KETBase** executable file (**KETBase.exe**) and follows the menu prompts to commence data input and subsequent data manipulation and reporting capabilities.

**KETBase** accepts specific emitting processes and equipment information such as device type and operating parameters, material throughput, raw material characteristics, and operating parameters to produce an air emissions quantification specific to the emitting process or device.

The relational database can report total air emissions of regulated compounds for each emitting processes or equipment. The "reporting module" allows maximum

flexibility to the user via usage units, chemical specification, and a variety of reporting formats available for output. Reporting options are:

- (1) Emissions-Facility, Device, Air Pollutant
- (2) Usage-Facility, Device, Air Pollutant

Most emission factor information within the database for emission quantification methodology was drawn from Environmental Protection Agency (EPA) documentation. Regulatory approved emission factors were entered into the database and utilized for the emission quantification process. Best Available Control Technology (BACT) and Maximum Achievable Control Technology (MACT) information was entered for each emitting device or process. Data was derived from the EPA, the California Air Resources Board (CARB), and the South Coast Air Quality Management District (SCAQMD).

When information was available from these sources, a maximum of three viable control technologies were loaded into the database Control Technology Module of

the **KETBase** system. The specific applicable control technology can be determined on a case-by-case basis and within the regulatory guidelines. A complete detailed analysis of control technologies for Hazardous Air Pollutants (HAPs) is presented in an EPA document available under ISBN designation O-86587-301-1.

The **KETBase software (3.5"** disc) is included with this report and the user's manual is attached as Appendix C.

It should be noted that a few user limitations exist in the current configuration of the KETBase software included with this project. These limitations include:

- ◆ The software is generic in nature and is not intended to apply to a specific shipyard situation.
- ◆ The process or equipment emission calculations do not incorporate the associated control technology efficiencies.
- ◆ The user is not able to add new process categories to the database. This option requires database modification.

Assistance with modifying or customizing the database for a unique shipyard envi-

ronment can be obtained from Kleinfelder Consultants of San Diego, California (who originally developed the software), or other software consultants.

At the time of publication of this report, several of the shipyards that had received advance copies of the database were contacted for feedback. Responses indicated that none of the yards had as yet evaluated the applicability and usefulness of the database to their operation.

## **6. REFERENCES**

1. Environmental Protection Agency, Document AP-42.
2. Environmental Protection Agency, ISBN: 0-86578-301-1: "Control Technologies for Hazardous Air Pollutants", 1992
3. Federal Clean Air Act Amendments of 1990.

## **APPENDIX A**

### **Sample Shipyard Survey**

**SHIPYARD SURVEY REPORT**  
**NSRP Air Toxics Emissions Inventory Project**

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Facility Name: \_\_\_\_\_  
Location: \_\_\_\_\_  
Point of Contact: \_\_\_\_\_  
Department: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Telephone No: \_\_\_\_\_  
Fax No: \_\_\_\_\_

---

Summary of Air Toxic Emissions Sources (Device & Operational Sources) - Please provide a listing of the types of operations conducted at your facility by device type. It is not necessary to account for every device (e.g. every portable blasting unit), however, please provide account for each differing operation (e.g. garnet versus steel shot blasting). When available, please provide an estimate on the relative operating hours or material usage per device.

**A. Fugitive Source Types**

**Please check those operations performed onsite and approximate number of units.**

**Welding (Stationary & Portable)**

**Types:**

1) _____	5) _____
2) _____	6) _____
3) _____	7) _____
4) _____	8) _____

**Open Blasting**

**Types (list differing media and substrate types)**

1) _____	5) _____
2) _____	6) _____
3) _____	7) _____
4) _____	8) _____

**Coating Operations**

**Types (list differing coating types and substrates)**

1) _____	5) _____
2) _____	6) _____
3) _____	7) _____
4) _____	8) _____

**SHIPYARD SURVEY REPORT**  
**NSRP Air Toxics Emissions Inventory Project**

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**Processing Tanks**

Types:

1) \_\_\_\_\_  
2) \_\_\_\_\_  
3) \_\_\_\_\_  
4) \_\_\_\_\_

5) \_\_\_\_\_  
6) \_\_\_\_\_  
7) \_\_\_\_\_  
8) \_\_\_\_\_

**Plating Tanks**

Types:

1) \_\_\_\_\_  
2) \_\_\_\_\_  
3) \_\_\_\_\_  
4) \_\_\_\_\_

5) \_\_\_\_\_  
6) \_\_\_\_\_  
7) \_\_\_\_\_  
8) \_\_\_\_\_

\_\_\_\_\_ **Misc. Processes Not Listed (Device & Material Usage/Feed)**

1) \_\_\_\_\_  
2) \_\_\_\_\_  
3) \_\_\_\_\_  
4) \_\_\_\_\_

5) \_\_\_\_\_  
6) \_\_\_\_\_  
7) \_\_\_\_\_  
8) \_\_\_\_\_

[examples include: Solvent cleaning ops, Solvent stills, Plastics machining/fabrication & lay-up, Fuel dispensing and Aqueous waste treatment]

**B. Point Source Types**

**Combustion Sources** (List approximate number of units and type of fuel used)

Device	Number	Fuel Types Used
a. Boilers	_____	_____
b. Compressors	_____	_____
c. Generators	_____	_____
d. Cranes	_____	_____
Cogeneration	_____	_____
f. Furnaces/Ovens	_____	_____
g. Cooling Towers	_____	_____
h. Crucibles	_____	_____

\_\_\_\_\_ **Process Not Listed (Device & Material Usage/Feed)**

1) \_\_\_\_\_  
2) \_\_\_\_\_  
3) \_\_\_\_\_  
4) \_\_\_\_\_

5) \_\_\_\_\_  
6) \_\_\_\_\_  
7) \_\_\_\_\_  
8) \_\_\_\_\_

**SHIPYARD SURVEY REPORT**  
**NSRP Air Toxics Emissions Inventory Project**

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**c. Software/Hardware Survey**

Please provide the following information so that we may assess the current computer capabilities within your environmental organization.

**Current system Configuration (IBM compatible):**

C P U 4 8 6 K \_ 3 8 6 K \_ 2 8 6 K \_  
Hard Drive \_ y e s \_ n o R A M \_ (Mb) .-  
Floppy Drive \_ y e s \_ n o  
DOS Version  
R A M  
Graphics Adapter y e s \_ n o  
Math Coprocessor y e s n o

Microsoft Windows environment Employed? y e s n o

**Spreadsheet Software Used:**

E x c e l \_ Quattro \_ Lotus 123  
O t h e r (\_\_\_\_\_)

**Database Software Used:**

\_ Dbase 111/IV \_ Paradox  
O t h e r (\_\_\_\_\_)

Please forward any questions and final responses y fax to (61 9) 578-6792. by phone to 619 578-7750 or by mail to O.P. &L. Inc. 10660 Scripps Ranch Blvd. Ste. 200. San Diego, Ca 92131- Contact: Anna Peteranecz

## **APPENDIX B**

### **Summary of Shipyard Survey Results**



	SHIPYARD	LOCATION	REPRESENTATIVE	PHONE	FAX	SURVEY SENT	RESPONSE RECEIVED
1	American Waterways Shipyard	New York	Bob O'Neill	(703) 841-9300		x	
2	Alantic Marine, Inc.	Florida	Tim Welsh	(904) 251-1582	(904) 251-1579	x	
3	Avondale Shipyard	Louisiana	Mike Simpson	(504) 426-5502	(504) 436-5470	x	x
4	Bath Iron Works	Maine	Gary Patziaff	(207) 442-1469	(207) 442-3356	x	x
5	Bay Shipbuilding	Wisconsin	Robert Minton	(414) 746-3255			
6	Bethlehem Steel Corp.	Texas	Jim Corcoran	(409) 985-0532	(409) 985-0554	x	x
7	Caddell Drydock	New York	Steve Kail	(718) 442-2112	(718) 981-7493	x	
8	Cascade General Inc	Oregon	David Donaldson	(503) 285-1111	(503) 289-7179	x	x
9	Charleston Naval Shipyard	S. Carolina	E. P. Johns	(803) 743-6320	(803) 743-2643	x	
10	Daves Boat Works	Virginia	Dan Mayhen	(804) 247-0101	(804) 244-7866	x	x
11	General Ship Repair Corp.	Maryland	Derick Lynch	(310) 752-7620			
12	General Dynamics Electric Boat	Connecticut	Larry Jordon	(203) 433-5751	(203) 433-6440	x	
13	Honolulu Shipyard, Inc.	Hawaii	Bruce Young	(808) 848-6230	(808) 848-6279	x	x
14	Ingalls Shipbuilding	Mississippi	Melanie Bosarge	(601) 935-2264			
15	Long Beach Naval Shipyard	California	Steve Knouse	(301) 547-7868	(310) 435-1032	x	
16	Mare Island Naval Shipyard	California	Bob Dinofrio	(707) 646-7612	(707) 646-6365		
17	Marinette Marine Corp.	Wisconsin	Barney Bentgen	(715) 735-9341	(715) 735-3516	x	
18	Newport News Shipbuilding	Virginia	Ken Congleton	(804) 380-2574		x	
19	Norfolk Naval Shipyard	Virginia	James Schrickland	(804) 396-3490	(804) 396-7026	x	x
20	Philadelphia Naval Shipyard	Pennsylvania	Edward Mortens	(215) 897-3469	(215) 897-2387	x	
21	Pearl Harbor Naval Shipyard	Hawaii	Brian Fugmoto	(808) 474-9080	(808) 474-9030	x	
22	Peterson Builders	Wisconsin	John Meacham	(414) 743-5574	(414) 743-6089	x	x
23	Port of Portland	Oregon	Fletcher Hunt	(503) 240-3030	(503) 240-3080	x	x
24	Portsmouth Naval Shipyard	N. Hampshire	Andy Swett	(207) 438-5042	(207) 438-5173	x	x
25	Puget Sound Shipyard	Washington	Clark Pitchford	(206) 476-4049	(206) 476-5295	x	x
26	Tacoma Boat Building	Washington	Ray Nichols	(206) 572-3600	(206) 572-0548	x	
27	Textron Marine Systems	Louisiana	John Kelly	(504) 245-6600	(504) 245-6634	x	x
28	Walker Boat Yard	Kentucky	Mark Duley	(502) 444-4045	(502) 444-4018	x	x
29	West State Inc.	N. Carolina	Walter	(919) 395-3351			

Table B1. Shipyard List

FACILITY	LOCATION	WELDING	BLASTING	COATING	PROCESSING		MISC. PROCESSING	POINT SOURCES								
					TANKS	PLATING		Blrs	Comp	Gen	Cra	Cog	Ove	CT's	Cru	Misc
Port of Portland	Oregon	Wire (7) Plasma Cutter Tig Electrode (8) Port. Gas (6) Cut/Burn (13)	N/A	Paint Booth (1)	Hot Caustic Parts Clean (3) 20K of Oil (2)	N/A	Oil Cookers (4) Oil/Water Sep (9) 2K Oil Storage (4) Unld Tank Diesel Tank	2	4	5	16	0	0	2	0	
Cascade General, Inc.	Oregon	SMAW Brazing GTAW FCAW TIG MIG	Steel Shot 5% Copper Slag 92% Silica Sand 3%	Epoxy SPC Paint Booth	Sanitary Holding Oil Stop Holding	N/A	Machine Solvents Cleaning Solvent Paint Still	0	3	6	3	0	1	0	0	
West State, Inc.	Oregon	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Puget Sound Naval Shipyard	Washington	GMAW GTAW SMAW MISC Thermal Spray	Garnet Copper Slag Aluminum Oxide Steel Shot Contained Units	MISC CTNG MISC ADH Plastics Coal Tar Pitch Encapsulation	MISC TANKS V. degreaser (3)	MISC TANKS	Grinding Sawing	45/3	0	19	17	0	70	0	0	
Textron Marine Systems	Louisiana	Robotic Unit MIG/Heli-Arc Portable (250)	N/A	Spary Coat	N/A	N/A	N/A	0	3	0	8	0	0	0	0	
Bath Iron Works	Maine	SMAW GMAW GTAW FCAW SAW	Steel Shot Black Beauty Aluminum Oxide Garnet Walnut Shell	Epoxies Alkoyds Inorg. Zn Anti-Foul High Temp Solvents	Chromic Acid MeCl Dip Sulfamic Acid FeCl3 Etch Solvent Clean		Unld Tank Diesel Tank DFM & #6 Oil Refrig. Recharge Al Flame Spray Grinding Ship Exhaust	13	0	6	6	0	10	0	0	
Peterson Builders, Inc.	Wisconsin	Stick/SS (40) MIG (10) TIG (10) Sub Arc	Black Beauty 27t Olivine 400 t Steel Shot	Epoxies Enamels Wd Varnishes Wd Lacquers Rubber/Fibgls Paint Booth Drying Oven	N/A	N/A	Fiberglas Lay-up	2	4	0	2	0	1	0	0	
BethShip Sabine Yard	Texas	Miller Elec. (100) Power Con (2-4) Miller (6) Dsl/Ele.	Coal Slag	Inorg. Zn Epoxies Anti-Foulants Specialty Ctns Alkyds Preservatives	N/A	N/A	Thinner Dst/Rec. Frac Tanks (2) Diesel Tanks (3) Gasoline Tanks (1)	0	5	1	4	0	0	0	0	

Legend for Point Sources

Blrs = Boilers

Comp = Compressors

Gen = Generators

Cra = Cranes

Cog = Cogeneration

Ove = Furnaces/Ovens

CT's = Cooling Towers

Cru = Crucibles

\* West State Inc. conducts the same operations as Cascade, in fairly equal proportions.

Table B2. Survey Results

## **APPENDIX C**

**“KETBase” Emissions Tracking Database**

**User’s Manual**

## TABLE OF CONTENTS

---

<b>1.0 INTRODUCTION</b>	<b>1</b>
<b>2.0 SOFTWARE OVERVIEW</b>	<b>2</b>
2.1 KETBASE EFFICIENCY	2
2.2 KETBASE EASE OF USE	2
2.3 KETBASE DATA RELIABILITY AND SECURITY	2
2.4 KETBASE FLEXIBILITY	3
<b>3.0 STARTING-LOGON</b>	<b>4</b>
3.1 STARTING KETBASE	4
3.2 LOGON	4
<b>4.0 MAINMENU</b>	<b>5</b>
4.1 BACT/QUANTIFICATION EQUATIONS	5
4.3 PROCESS MODULE	6
4.4 SPECIES MODULE	6
4.5 DESTINATION	6
4.6 REPORTS	6
4.7 UTILITY	6
4.8 QUIT	6
<b>5.0 COMMONKETBASEFUNCTIONS</b>	<b>8</b>
<b>6.0 BACT/QUANTEQUATIONS</b>	<b>10</b>
6.1 SCREEN DESCRIPTION	10
6.2 ADDING A NEW PREFERENCE LEVEL	13
6.3 EDITING AN EXISTING PREFERENCE LEVEL	13
6.4 DELETING AN EXISTING PREFERENCE LEVEL	13
<b>7.0 PROCESSMODULE</b>	<b>14</b>
7.1 SCREEN DESCRIPTION	14
7.2 ADDING A NEW PROCESS	16
7.3 EDITING AN EXISTING PROCESS	18
7.4 DELETING AN EXISTING PROCESS	18
<b>8.0 SPECIESMODULE</b>	<b>19</b>
8.1 SCREEN DESCRIPTION	19
8.2 ADDING A NEW PRODUCT	21
8.3 EDITING AN EXISTING PRODUCT	23
8.4 DELETING AN EXISTING PRODUCT	23
<b>9.0 CALCULATIONMODULE</b>	<b>24</b>
9.1 EMISSION ESTIMATION TECHNIQUES	24
9.2 EMISSION CATEGORIES	24
<b>10.0 REPORTMODULE</b>	<b>25</b>
10.1 REPORT PRINTING	25
10.2 REPORT SELECTIONS AND OUTPUT DEVICES	25

## TABLE OF CONTENTS

---

<b>11.0 UTILITY .....</b>	<b>28</b>
11.1 SCREEN DESCRIPTION .....	28
11.2 EDITING AN EMISSION FACTORS .....	29
11.3 ADDING A NEW EMISSION FACTOR .....	29
11.4 DELETING AN EXISTING EMISSION FACTOR .....	29
<b>APPENDIX A .....</b>	<b>30</b>

## 1.0 INTRODUCTION

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With the development of Title V requirements under the Clean Air Act, facilities are faced with the possibility of preparing and maintaining device specific toxics and criteria pollutant inventories. Traditionally, preparing such an inventory involves a great deal of field work by the facility's environmental group. Emitting process devices have to be cataloged, process throughput calculated, Material Safety Data Sheets reviewed, and emissions calculated. Unfortunately, many of these tasks must be repeated every time an emissions inventory is required, thus wasting valuable time.

Rather than performing all the tasks associated with completing an emissions inventory manually, a facility can use the relational database to electronically track and calculate usage throughput and emissions. A facility can enter usage data on a regular basis (daily, weekly, monthly, etc.) and calculate new usage and emissions values at anytime. KETBase has an almost limitless sorting and output capability that can produce reports containing almost any information in almost any format.

KETBase is designed in modular fashion with standalone modules that track process devices and their throughput, feedstock speciation, control devices, emissions quantification, and reporting.

This manual is organized roughly the same as the KETBase main menu. Thus, if a user needs information about the Process Module he should turn to that section of this manual. It is designed to give the user a brief overview of each screen and each function prior to presenting detailed instruction. Thus within each section, brief screen and function descriptions are given before any of the actual instructional text.

The instructional portion of the manual sections (these are generally titled something active like "Adding a New Process") are written in paragraph format and basically, walks the user through a procedure. All of the keystrokes that are required are in **bold**.

KETBase is an interactive, relational database designed to track device specific feedstock throughput product speciation, control device effectiveness, and pollutant emissions. The heart of this database is the commercial database package, Paradox (DOS-Version 4.0). All of the data management, sorting, and reporting scripts are written with Paradox Application Language (PAL). A custom interface allows the user to quickly use KETBase without ever learning the Paradox software. Key design goals were efficiency, ease of use, data reliability and security, and flexibility.

### **2.1 KETBase Efficiency**

Efficiency is assured by KETBase's "enter once, use multiple times" design. As long as the product and speciation databases are maintained, throughput and emissions reports can be printed multiple times, anytime. This ensures that a facility will only have to visually inspect production areas once, relying on survey forms for future throughput updates.

### **2.2 KETBase Ease of Use**

As powerful as we wanted this tool, we did not want to design a wieldy, difficult to use piece of software. We felt that a steep learning curve would prevent the full use of this tool. So we designed KETBase to be an exceptionally easy tool that maintains all of the features and abilities of a fully relational database. To accomplish this, we built a user interface that acts as a buffer between the user and Paradox. This user-friendly interface consists of a menu bar listing easy to understand options such as Search, Edit Post, and Exit. These commands are activated by function keys and control/alternate key strokes.

In addition, a lookup feature has been programmed into KETBase. The lookup feature can be accessed at pertinent points of the database. For example, if the user is in a product usage field, by activating the lookup feature, KETBase will open a screen with an alphabetic listing of previously entered products. The user can then scroll through this lookup screen and choose a product. For a detailed description of where this feature is active, refer to Section 4.0.

### **2.3 KETBase Data Reliability and Security**

A key ingredient of any successful database is data reliability and security, and the KETBase is not an exception to this rule. The data for all the modules are saved in one file, thus ensuring ease of data maintenance. Backups for data files are easily made by simply using DOS copy commands. In addition, password protection can be added to any feature of KETBase. As an example, edit and

delete privileges can be password protected to ensure that only a limited number of people can change or erase KETBase data. This can prevent the loss of data due to clerical mistakes.

In addition a password system has been added to grant various levels of editing privileges. This allows a facility manager to strictly limit and access to various KETBase users.

## **2.4 KETBase Flexibility**

KETBase was designed with flexibility in mind. It can be customized to accept data and calculate emissions for any type of process. It can store and utilize information for most control devices, and can handle any number of pollutants. Even better, reports can be custom designed to report any data existing in the base. For example, for certain facilities two reports will usually be sufficient: 1) a process report that lists product usage and pollutant emissions for each device, and 2) a facility report that summarizes product usage and pollutant emissions for the whole facility. For facilities with more specific needs, more detailed reports can be created. A large aerospace component manufacturing facility, for example, may want usage and emissions reports for groups of similar devices or for process areas.

In addition to the flexibility of data management and reporting, KETBase also allows a wide range of freedom with respect to time periods. This means that a facility can maintain KETBase with any sort of time frame in mind. All the data for any length of time can be stored in one discrete data file. Because most regulatory requirements consist of annual emissions reporting, many facilities will choose to maintain all pertinent data for one calendar year in a data file. However, as a facility's reporting needs vary, the amount of data stored in one file can vary as well. As an added feature, individual data files can be combined into a larger data file to facilitate reporting. For example, four data files containing usage data for one quarter each can be combined to create annual reports.



## **3.0 STARTING-LOGON**

---

### **3.1 Starting KETBase**

To access KETBase simply type ``ketbase" from the pdox4O directory. This activates a batch file that will load and setup KETBase.

### **3.2 LOGON**

When a user first enters the KETBase program a dialogue box will open requesting a password. The user should simply key in his/her password and hit enter. Now the KETBase main menu should appear. If a wrong password is entered, the user must exit then restart KETBase with the new password. Please see Appendix A for passwords and security levels.

## 4.0 Main Menu

---

The first screen that is displayed on screen upon entering the KETBase program is the KETBase main menu. This menu has eight selections available including: BACT/Quantification Equations, Calculate, Process, Species, Destination, Reports, Utility and Quit. The menu looks like this:

Main Menu	
BACT / Quant Equations	
Calculate	
Process	
Species	
Destination	
Reports	
Utility	
Quit	

Each of these selections can be accessed by one of two ways. First, the cursor control keys can be used to scroll through the six choices. The “Enter” key is then used to choose the appropriate selection. The second selection method is to simply type in the first letter of each choice (hot key access). These letters are highlighted for ease of recognition. For example, the Process module can be accessed either by hitting the “cursor down” key two times and striking the “Enter” key or by typing “P”.

### 4.1 BACT/Quantification Equations

The KETBase BACT/Quant Equation module contains useful data concerning each of KETBase’s thirteen emissions categories. Both Best Available Control Technology (BACT) and Emissions Quantification information is contained here. The user may access this module to lookup either control technology or emissions quantification information for a specific emissions category. Additional data for these two topics can be added as they become available.

### 4.2 Calculate

This selection does not access any specific module. In fact its only purpose is to instruct KETBase to recalculate all emissions. Each time data is either added or changed in KETBase this selection needs to be made in order to maintain data currency. It is most efficient to use the Calculate function at the end of a data entry session.

### **4.3 Process Module**

This selection allows the user to access the KETBase process module. This module tracks specific process information on a device specific level. Device numbers, permit numbers, emission category, make and model of the equipment, usage units, and material throughput are the items tracked by this module.

### **4.4 Species Module**

This selection accesses the KETBase species module. Here, density, solids content, VOC content, and chemical speciation for each paint, solvent and adhesive can be stored. Also, this module tracks toxic contents for weld rods. For processes that do not require speciation for emission quantification (i.e., diesel combustion), their products are included here to maintain the products lookup table.

### **4.5 Destination**

The Destination selection brings up a second menu of three choices: printer, screen, or file. These choices are the output devices that the Report choice will use. The default choice is screen.

### **4.6 Reports**

This selection offers the user a second menu of six report choices. Access to the choices on this menu operates in the same fashion as those on the main menu. These reports can be sent to a Paradox 4.0 compatible printer, a DOS file, or the screen (see section, **4.5 Destination**).

### **4.7 Utility**

This selection offers the user the chance to edit the emission factors used in KETBase. A screen for each individual emission factor is displayed at a time to facilitate easy editing.

### **4.8 Quit**

This choice allows the user to exit KETBase to DOS. KETBase will ask the user to confirm this menu selection by asking if the user is sure he wishes to exit. "Yes" exits the user to DOS, and "No" brings the user back to the main menu.

## 5.0 COMMON KETBASEFUNCTIONS

---

The following commands are common for all modules in KETBASE:

### Page Up/Page Down

From the BACT/Quant Eq, Process and Species Modules subsequent forms can be viewed by using these two keys. Page Down advances the screens by one process product and conversely, Page Up brings the screen back one process product.

### F1 - Lookup Table

From the several specific places within each module (see below) the “F1” key will open a lookup table containing possible entries for the field. This will only work for certain fields and only when in the edit mode. To select a record from the lookup tables, use the cursor control keys to highlight the entry and select it with the “F2” key. The fields that have an active lookup table are:

- Process Module
  - Process ID (Equipment Section)
  - Product ID (Usage Section)
- Species Module
  - CAS (Toxics Section)

### F7- Table/Form Toggle

The F7 key in the BACT/Quant Eqs, Process, and Species modules is a toggle between the two different ways each module can be viewed. Every time the user presses this key KETBase toggles from one form to the other. The form mode is the standard data viewing and entry mode. In this mode all the data is organized on a form that is centered around each category, process, or product within each respective module. This mode is useful for data entry and detailed viewing of one specific category, process, or product.

The table mode lists all the information contained within each module in a tabular fashion. Each column of the table is labeled to facilitate user understanding. This mode is useful to see many items at one. It can also be used to find specific categories, processes, or products.

### F8 - Exit

The F8 key in the BACT/Quant Eqs, Process, and Species modules exits the respective module and brings the user back to the KETBase main menu.

### F9 - Edit

The F9 key in the BACT/Quant Eqs, Process, and Species modules allows a password qualified user to enter the edit mode for each screen.

### Insert- Adding a New Record

By hitting the Insert key from the edit mode from within the three data entry modules of KETBase,

the user can insert anew record. For the BACT/Quant Eq. module, the Insert key will insert new preference levels from the BACT and Quant portions of the screen and will insert a completely new record from the Process portion. For the Process and Species Modules, Insert will insert a *new* record from any field. This key is active in the edit mode only.

#### Delete - Delete an Existing Record

The Delete key in the Process, and Species modules will delete the record that is being viewed or edited. It will delete a preference level from the BACT or Quant portions of the BACT/Quant Eq modules. KETBase will ask the user to verify this command before carrying it out.

#### Ctrl Z - Search

In the BACT/Quant Eqs, Process, and Species modules, Ctrl Z activates the search function. This instructs KETBase to search all entries within the cursor field for a particular alphanumeric string. For example, if a user wanted to see what emission category 2 is, a search can be performed within the BACT/Quant Eq module. The user merely positions the cursor within the “Process ID” field and hits Ctrl Z. At the prompt the user types in “2” for category 2 and initiates the search. KETBase will automatically pull up the BACT/Quant Eq form for category 2 - < 10 MMBtu natural gas combustion devices. Wildcard entries are specified by two successive periods, “..”. This feature is analogous to the MS DOS wildcard, “\*”.

KETBase searches are case sensitive, and all entries within KETBase are capitals. Thus the user should maintain “Caps Lock” during KETBase searching (the use of “Caps Lock” during all operations is recommended).

#### Alt Z - Search Next

In many cases, a search can result in multiple forms that satisfy the search criteria. For example, a search for “.. GAS..” in the “Description” field in the BACT/Quant Eq module should result in five cases: diesel gas combustion, gasoline storage tanks, and the three natural gas combustion categories. However, KETBase can only display one result at a time, and will display the first searched item that it finds. To access subsequent searched items, a user only needs to press Alt Z until the correct item appears. So, if the user is looking for “> 100 MMBtu natural gas combustion devices” (Cat. 13) by using the search string “..GAS..” and KETBase shows “Diesel gas combustion devices” (Cat. 1) then the user must press Alt Z four times.

The KETBase BACT/Quant Equation module contains useful data concerning each of KETBase's thirteen emissions categories. Both Best Available Control Technology (BACT) and Emissions Quantification information is contained here. The user may access this module to lookup either control technology or emissions quantification information for a specific emissions category. Any new information about control technology or emission quantification can be stored in this module as well. The lookup feature is inactive in this module.

### 6.1 Screen Description

The KETBase BACT/Quant Equations module contains BACT (Best Available Control Technology) that is presently usable by devices within each process category (process ID) and the emission quantification equations that are used by KETBase. For a process category multiple BACTs or quantification equations may exist, thus, KETBase has different preference levels for BACT and quantification equations. For example, preference level 1 for paintings/coatings BACT may be catalytic oxidation and preference level 2 maybe carbon absorption. This capability allows the user to track multiple technologies and quant methods for the same process category. This module is organized around the process categories, in other words, there is a separate data screen (record) for each of the thirteen process IDs.

#### Process

The Process section is the uppermost portion of the screen in this module. It contains the Process ID, Description, and Usage units for the process type being displayed. When the page up and page down keys are used from this section, the module will scroll through the various process IDs.

The data fields for this section are:

Process ID: This field contains the Process ID for the process category that is being displayed.

Description: This is the title of the process category that is being displayed.

Units: This the type of units that are used for tracking usage for the process category displayed.

#### BACT

The BACT (Best Available Control Technology) section is the second part of this module's screen. It consists of data fields that contain BACT information. The preference level, type of technology, two typical vendors, and other memo fields are contained here. This module already contains some data entered by Kleinfelder. These data can be deleted or edited and new data can be added. When the Page Up and Page Down keys are used from this section, the module will scroll through the

various preference levels for BACT.

The data fields for this section are:

- |                    |   |
|--------------------|---|
| <u>Pref. Level</u> | The preference level for the BACT section. There will be as many preference levels as there are BACTs stored for a particular process ID.     |
| <u>Tech</u>        | This field contains the type of control technology that is being displayed by the present BACT preference level.                              |
| <u>Vendor 1</u>    | This field contains a vendor that sells the type of BACT that is indicated by the present BACT preference level. *                            |
| <u>Vendor 2</u>    | This field contains a second vendor that sells the type of BACT that is indicated by the present BACT preference level. *                     |
| <u>Memo 1</u>      | This field can store any alphanumeric string, but we have entered the control efficiency for the BACT in the present preference level here. * |
| <u>Memo 2</u>      | This field can store any alphanumeric string, but we have entered the removal cost for the BACT in the present preference level here. *       |
| <u>Memos 3-5</u>   | These fields are blank and can be used by facilities to store any alphanumeric string.  |

\* KLeinfelder does not endorse or recommend any of these vendors, nor do we guarantee the removal cost or efficiency of any of their products.

## Quant

The Quant (Emissions Quantification Equations) section is the bottom part of this module's screen. It consists of data fields that contain emission quantification information. The preference level, source, hourly emission equations, annual emission equations, and memo fields are contained here. This module already contains some data entered by KLeinfelder. These data can be deleted or edited and new data can be added. When the page up and page down keys are used from this section, the module will scroll through the various preference levels for Quantification Equations.

The data fields for this section are:

- |                    |   |
|--------------------|---|
| <u>Pref. Level</u> | The preference level for the Quant section. There will be as many preference levels as there are Quantification Equations stored for a particular process ID. |
| <u>Source</u>      | This field contains the source for the equation being displayed by the present Quant preference level.  |
| <u>Hourly Eq</u>   | This field contains the hourly emission quantification equation that is recommended for the present process ID.   |

**Annual Eq:** This field contains the annual emission quantification equation that is recommended for the present process ID. Please note that the preference level 1 equation is the equation used by KETBase.

**Memos 1 - 5:** These fields can be used by facilities to store any alphanumeric string. For the preference level 1 equations, the variables in the quant. equations are defined here.

### **Mode**

This module has two modes available to the user. The default mode is the view mode. KETBase will always be in this mode, unless the user directs it to change to the edit mode. The view mode allows the user to view the information contained in the screen. The second mode is the edit mode which is accessed by pressing the “F9” key. In this mode, a user is able to append existing data, add new data (by pressing the “Insert” key anytime he is in the edit mode), or delete existing data. To save changes and to exit the edit mode, the user should press “F2” to post the entry.

### **Post (F2)**

This command allows a user to post or save new entries and edits. This command can only be accessed in the “edit” mode. This command exits the “edit” mode and brings a user back to “view: mode.

### **Process (F3)**

This command is to make the cursor (representing the active field) jump to the “Process” section of the screen. This command works for both the view and the edit mode.

### **BACT (F4)**

This command is to make the cursor (representing the active field) jump to the “BACT” section of the screen. This command works for both the view and the edit mode.

### **QuantEQ(F5)**

This command is to make the cursor (representing the active field) jump to the “Quant” section of the screen. This command works for both the view and the edit mode.

### **Exit (F8)**

This command is only available in the view mode. It exits the user to the KETBase main menu.

### **Edit (F9)**

This command allows the user to enter the “edit” mode. Refer to the section on Modes, above, for more detail.



## 6.2 Adding a New Preference Level

The user should not add an additional process ID to this module but can add new preference levels for both the BACT and the Quant Eq sections. To do this, you should select “BACT/Quant Eq” from the main menu. The user should select the process category to which he wishes to add new information (this is done by scrolling through the “Process” section with the **Page Up** and **Page Down** keys).

When you reach the process ID of choice bring the cursor to either the “BACT” or the “Quant” section by using the F4 or F5 keys. Now press the F9 key to enter the edit mode. From any field in the appropriate section press the **Insert** key to begin a new preference level. Now enter the appropriate data and press F2 when finished.

## 6.3 Editing an Existing Preference Level

To edit an existing preference level, find the preference level (for either “BACT” or “Quant”) that requires editing and enter the edit mode (with the F9 key). Move to the field that requires editing (details for maneuvering around the Process module screen are given in detail in Section 6.2). Use the **Backspace** to erase the old entry one character at a time or the **Shift-Backspace** to erase the old entry all at once. At the empty field, enter the correct string. When done editing hit F2 to post corrections.

## 6.4 Deleting an Existing Preference Level

To delete an existing preference level, find the preference level (for either “BACT” or “Quant”) that requires deleting and enter the edit mode (with the F9 key). Make sure the cursor is in the correct preference level and hit the **Delete** key. KETBase will ask if you are sure you wish to delete this entry. If you answer “yes”, the preference level will be deleted, if you press “no”, KETBase will default to the original screen.

The Process Module of KETBase is accessed through the main menu choice, “Process”. This module has one main function: the tracking of emitting processes and their product usage rates. This module consists of one “screen” per emitting device. Each screen is split into two sections, the equipment and the usage sections. (The user can view this module in Table view which will show all of the entries in a table).

### 7.1 Screen Description

#### Equipment #:

The equipment section is the upper half of the screen. It consists of data entry fields that allow the user to input various pertinent process information for each discrete emitting device. This information will include:

Equipment #: This field accepts a ten digit alpha-numeric entry. This text field serves as an identifier for the user. Recommended entries for this field are unique process identifications (i.e., PB-1 for paint booth 1 or BB2-1 for blast booth 2, building 1). A facility device or asset number is a good candidate for this field.

Permit No.: This field allows the tracking of individual local regulatory agency air permit operating number. This field accepts fifteen characters.

Manufacturer: This thirty character field accepts any alpha-numeric string. Its purpose is to store a user recognizable string. Make and model of the specific device is good data for this field.

Period: This field accepts a seven digit field that indicates the period the usage data is from. For example, if a facility is maintaining data in one year pieces then the year for specific data is appropriate for this field (i.e., 1993). If a facility chooses to keep data in irregular time frames, a predetermined code can be placed in this field (i.e., “1-92” could denote the first quarter of 1992).

Process ID: This field contains the emission category number for the device being entered. This number determines what product usage units to use and which emission quantification methods to employ. The lookup feature is active on this field.

Usage Units: This field contains the unit type that usage data must be entered in. For example, for diesel combustion devices (category 1) the usage units are “1000 gallons”. This field is automatically filled by KETBase contingent on

the emission category number entered in a previous field.

#### Usage Information

In addition to process information, this module will be an area that is designed to accept the specific products used and their respective amounts for each device. This portion of the module consists of three columns: 1) product 2) product number, and 3) amount used. These data are assigned by the user. Utilizing the emission category, KETBase will determine the correct units to use for the amount used column. For example, a paint booth will accept usage amounts in gallons (anticipating paint usage).

Product ID: This number is a fifteen digit alpha-numeric code that uniquely identifies each product. This number can be assigned by the user or can be a number assigned by the user company's purchasing department. As an example DF2 can be the number for diesel fuel #2. The lookup feature is active on this field.

Description: This field accepts a twenty digit alpha-numeric description of each product. For example next to the "DF2" entry, a user would input "Diesel fuel #2". This field is linked to the product number field so that if a product number has previously been entered along with a product description, subsequent entries of the product number will automatically enter the appropriate product description field.

Usage: This field accepts a twenty digit entry for product usage. This number must be in the units specified in the Equipment portion of the screen. In addition, it must be the throughput for the period specified in the Equipment portion of the screen

For duplicate entries, KETBase will offer the user two choices: Alt-L causes KETBase to accept the new entry and disregard the old entry. Alt-K allows the user to change the old entry to reflect the additional usage. If the second method is chosen, Alt-L needs to be pressed to enforce the change.

#### Mode

The Process module has two modes available to the user. The default mode is the view mode. KETBase will always be in this mode, unless the user directs it to change to the edit mode. The view mode allows the user to view the information contained in the screen. The second mode is the edit mode which is accessed by pressing the "F9" key.. In this mode, a user is able to append existing data, add new data (by pressing the "insert" key), or to delete existing data (by pressing the "delete"). To save changes and exit the edit mode, the user should press "F2" to post the entry.

#### Post (F2)

This command allows a user to post or save new entries and edits. This command can only be accessed in the "edit" mode. This command exits the "edit" mode and brings a user back to "view" mode.

### Equipment (F3)

This command is to make the cursor (representing the active field) jump to the “Equipment” section of the screen (the top, blue portion). This command works for both the view and the edit mode.

### Usage(F4)

This command is to make the cursor (representing the active field) jump to the “Usage” section of the screen (the bottom, green portion). This command works for both the view and the edit mode.

### Exit (F8)

This command is only available in the view mode. It exits the user to the KETBase main menu.

### Edit (F9)

This command allows the user to enter the “edit” mode. Refer to the section on Modes, above for more detail.

## **7.2 Adding a New Process**

To add a new process to the KETBase process module the user should select “Process” from the main menu. The user will now be in the view mode of KETBase’s process module. All adding must be done in the edit mode so press **F9** to enter this mode. Now from any field the user should press the **Insert** key to bring up an empty sheet. The user can fill in each successive field with the appropriate entries and then use the cursor control keys to maneuver around the sheet. Use the **F3** key to access the “Equipment” portion of the screen and the **F4** key to access the “Usage” portion.

The lookup feature, **F1** key, is active on the Process ID and the Product ID fields. The **F2** key will grab an entry from a lookup table. The usage amount field should be filled in with a number corresponding to the correct units shown in the Process Units field. After all of the fields have been appended, press **F2** to post the information and return to the view mode. Here is a summarized list of keystrokes for a typical entry:

- 1) Use **cursor control** and **enter** keys to select Process module from the main menu. Ensure that the caps lock key is on to force the use of capital letters. This facilitates the KETBase search feature. Also, make sure that the scroll lock key is off for all operations.
- 2) Press the **F9** key to enter edit mode.
- 3) Press the **Insert** key to begin new field.
- 4) Press **F3** key to bring cursor to the “Equipment” portion of screen. This will probably be unnecessary since the cursor is in this portion when the edit mode is started.

- 5) Enter the Equipment #. The facility equipment number would be a good choice for this field. (Each process equipment must have a unique number.)
- 6) Use the **cursor control** keys to go to each of the subsequent fields.
- 7) Use the equipment permit number to fill in the Permit # field.
- 8) The make and model of the equipment can be used to fill the Manufacturer field.
- 9) Fill in the Period field with the period. A year or a code can be used here.
- 10) At the Process ID field hit **F1** to bring up the lookup table. Use the **cursor control** keys to select the process ID that is appropriate for the equipment. When the cursor is on the selected ID, press **F2** to fill the field with the ID number.
- 11) Now that all of the Equipment portion is filled in press **F4** to access the usage portion. Note that after pressing F4 the Process and Units fields are filled in automatically.
- 12) At the Product ID field activate the process lookup table with the **F1** key to select a product. The selection procedure is outlined in step 10. This particular lookup table is filled by entries made in the Species module so if a product does not exist in the lookup table, it has not been entered in the Species module. (For this reason, the species module should always be updated first.) For several Process IDs the product entered will automatically be assumed to be a certain product (static) and for others a number of choices are available (dynamic). These areas follows:

Process ID	Dynamic	Expected Product
1		Diesel Fuel #2
2		Natural Gas
3		Natural Gas
4		Ampere-hours
5		Ampere-hours
6		Ampere-hours
.		Gasoline
8	X	Various weld rods as defined in Prod. Info
9	X	Various blast media as defined in Prod. Info.
10	X	Various solvents as defined in Prod. Info
11	X	Various coatings as defined in Prod. Info
12	X	Various adhesives/solvents clef. in Prod. Info
13		Natural Gas

- 13) If a Product ID that KETBase recognizes has been entered, then the Description field will automatically be filled in. Otherwise fill this field with a product descriptions.

- 14) Fill in the usage portion with a numerics string. It is very important that the units used here agree with those in the Units field (i.e., for diesel combustion usage must be in thousands of gallons).
- 15) Hit **F2** to post the entry.

### 7.3 Editing an Existing Process

To edit an existing process sheet merely enter the edit mode of the Process module (with the F9 key) and move to the field that requires editing (details for maneuvering around the Process module screen are given in detail in Section 6.2). Use the **Backspace** to erase the old entry one character at a time or the **Shift-Backspace** to erase the old entry all at once. At the empty field, enter the correct string. When done editing hit F2 to post corrections.

### 7.4 Deleting an Existing Process

To delete an existing process sheet select the appropriate record, enter the edit mode (use the **F9** key), and press the **Delete** key. KETBase will ask if you are sure you wish to delete this entry. If you answer “yes”, the record will be deleted, if you press “no” KETBase will default to the original screen.

## 8.0 SPECIES MODULE

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KETBase also contains a species module that is designed to track the toxic constituents for all products. This module is accessed through the “Species” module choice on the main menu.

The purpose of this module is to store product speciation data and allow KETBase to utilize product contents for emission calculations. KETBase will always have an up-to-date species table from which to draw necessary toxics data. The positive aspect of this module is that the species data will be entered once and then can be used many subsequent times. For example, a facility that uses many different paints can enter all the species data for their paints using MSDSs and then KETBase can calculate emissions and generate reports any number of times after that. This saves the facility’s environmental staff the constant review of MSDSs whenever emission reports need to be generated.

A facility will have to commit the time to enter toxic speciation data for all pertinent products using Material Safety Data Sheets or other sources. In addition, as new products are added to a facility’s operations, their species data must be added.

### 8.1 Screen Description

#### Product

The Product Section is the upper half of the Species module screen. It consists of data entry fields for various pertinent data. The information contained on each screen is for one, specific product (i.e., ACME Flat Black Exterior Paint #3). The fields are as follows:

Product ID: This field accepts a fifteen digit alpha-numeric entry that identifies a specific product. We recommend the use of a purchasing code or a user defined code. For example, “NG” can be used for natural gas and ACME-001 can be used for ACME Navy Gray Ship Paint. This field should be filled with a unique string for each unique product. The product lookup table is filled with entries from this field.

Prod. Name: This field accepts a twenty digit alpha-numeric entry that describes the specific product represented by the sheet. It is recommended that an easily recognizable string, such as a trade name, be used here. This field is the other field that the product lookup table uses.

Solid Content: This field is only used for paintings/coatings. It represents the fraction of a specific coating that is solid in nature. This information should be listed on the material safety data sheet or product specifications sheet. The entry for this field must be less than 1.0 (i.e., if the solid content is 23% then “0.23” should be entered).

**Density:** This field is used for paintings/coatings, solvents, and adhesives. It represents the density (in lb./gal) of the substance. This information can be found on the MSDS.

**DensityUnits:** This field is always filled with “lb./gal” and only serves to remind the user that density must be entered in lb./gal.

## **Toxics**

The Toxics Section is the lower half of the Species module screen. This section contains the actual speciation information for each product.

**CAS:** This field contains the chemical abstract service (CAS) number for the pollutant being speciated. The lookup function is active for this field and can be used to fill this field and the “toxic component” field.

**Toxic Comp.:** This field contains the Chemical that is being speciated. This field will automatically be filled if the “CAS” field is filled with the lookup function.

**Speciation:** This field contains the relative content of each species in the product on a mass basis. For example, in some pain, "1,4 dioxane" makes up 25% of the mass of the paint. Thus, for the "1,4 dioxane" entry for this paint the user should enter “0.25”. The entries in this field should never total more than 1.0.

## **Mode**

The Species module has two modes available to the user. The default mode is the view mode. KETBase will always be in this mode, unless the user directs it to change to the edit mode. The view mode allows the user to view the information contained in the screen. The second mode is the edit mode which is accessed by pressing the “F9” key.. In this mode, a user is able to append existing data add new data (by pressing the “Insert” key anytime he is in the edit mode), or to delete existing data. To save changes and to exit the edit mode, the user should press “F2” to post the entry.

## **Post (F2)**

This command allows a user to post or save new entries and edits. This command can only be accessed in the “edit” mode. This command exits the “edit” mode and brings a user back to “view: mode.

## **Product (F3)**

This command is to make the cursor (representing the active field) jump to the “Product” section of the screen (the top, blue portion). This command works for both the view and the edit mode.

## **Toxics (F4)**

This command is to make the cursor (representing the active field) jump to the “Toxics” section of the screen (the bottom, green portion). This command works for both the view and the edit mode.



### Exit (F8)

This command is only available in the view mode. It exits the user to the KETBase main menu.

### Edit (F9)

This command allows the user to enter the “edit” mode. Refer to the section on Modes, above for more detail.

## **8.2 Adding a New Product**

To add a new product to the KETBase species module the user should select “Species” from the main menu. The user will now be in the view mode of KETBase’s species module. All adding must be done in the edit mode so press **F9** to enter this mode. Now from any field the user should press the **Insert** key to bring up an empty sheet. The user can fill in each successive field with the appropriate entries and then use the cursor control keys to maneuver around the sheet. The “Solid Content” field should only be filled in for paints/coatings and the “Density” field must be filled in for paints/coatings, adhesives, and solvents. Use the **F3** key to access the “Equipment” portion of the screen and the **F4** key to access the “Usage” portion.

The lookup feature, **F1** key, is active on the CAS field. The **F2** key will grab an entry from a lookup table. When a CAS number is chosen in this fashion, KETBase will automatically fill in the “Toxics” Column with the correct chemical name. The “Speciation” field can be filled in with a numeric string of valueless than 1.0. This field represents the mass percentage of each toxic in the product.

Of particular importance, the criteria pollutant VOC (volatile organic compounds), must always be entered for paints, adhesives, and solvents. The speciation percentage for VOC is generally listed on MSDSs as VOC content (mass percentage must be used here). In addition, for paints only (Category 11) the criteria pollutant, PM10 (particulate matter < 10 microns) must be entered here to force KETBase to perform PM10 emission calculations for painting. The speciation amount is ignored by KETBase for PM10.

There are several “Species Module” records already entered when KETBase is delivered. These are for diesel fuel #2, natural gas, ampere-hours, and gasoline. The “Toxics” information portion of the screens for these products need not be entered. These only serve as placeholders for these products. This is done so that the product lookup table will list these substances. If you remove these records, these materials will be unavailable for the products lookup function in the future.

After all of the fields have been appended, press **F2** to post the information and return to the view mode. Here is a summarized list of keystrokes for a typical entry:

- 1) Use **cursor control** and **enter** keys to select Species from the main menu. Ensure that the caps lock key is on to force the use of capital letters. This facilitates the KETBase search feature. Also, make sure that the scroll lock key is off for all

operations.

- 2) Press the **F9** key to enter edit mode.
- 3) Press the Insert key to begin new field.
- 4) Press F3 key to bring cursor to "Product" portion of screen. This will probably be unnecessary since when the cursor is in this portion when the edit mode is started.
- 5) **Enter the Product ID, Product Name, Solid Content and Density** for the product (the solid content is only entered for paints, and 'density must be entered for paints, solvents, and adhesives). Use the cursor control keys to go to each of the subsequent fields.
- 6) Now that all of the Product portion is filled in press F4 **to access the Toxics portion.**
- 7) At the CAS field activate the CAS lookup table with the F1 key. Use the cursor control keys and F2 to select a CAS number for the appropriate toxic (the selection procedure is outlined in step 10 of Section 6.2). This particular lookup table is filled by a separate CAS table accessible through the Utilities command at the main menu.
- 8) If a CAS number that KETBase recognizes has been entered in the CAS field, then the Toxic Component field will automatically be filled in. Otherwise fill this field with a toxic components description.
- 9) Fill in the "Speciation" field with a decimal representing the mass content of the subject toxic (this number can never be greater than 1.0). All species that requires quantification should be listed here. In addition for paints, solvents, and adhesives a separate entry should be made for the mass content of VOCs since, often, the listed volatile species do not add up to the true VOC content of a product. Also, for paints only, an entry for PM10 must be listed here. This will force KETBase to calculate PM10 emissions from paint usage even though PM10 is not part of a paint's speciation.
- 10) Hit F2 to post the entry.

### 8.3 Editing an Existing Product

To edit an existing product sheet, merely enter the edit mode of the Species module (with the F9 key) and move to the field that requires editing. Use the Backspace to erase the old entry one character at a time or the Shift-Backspace to erase the old entry all at once. At the empty field, enter the correct string. When done editing hit F2 to post corrections.

## 8.4 Deleting an Existing Product

To delete an existing product sheet enter the Species module, select the product sheet that requires deleting, enter the edit mode, and press the **Delete** key. KETBase will ask if you are sure you want to delete this entry. If you answer “yes”, the record will be deleted, if you press “no”, KETBase will default to the original screen. Please note that the product lookup table is linked to this module so that a deletion of a product in this module may cause that product to be removed from the product lookup table.

## 9.0 CALCULATION MODULE

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The KETBase Emissions Calculation Module can be accessed by the “Calculate” selection at the main menu. When a user accesses this command, KETBase will activate a programmed set of emissions calculation algorithms. KETBase will access all usage records, emission factors, and speciations, calculate device specific emissions, and append a master results table. KETBase will print messages to the screen so that a user may track KETBase’s progress.

This command should be used every time the KETBase data files are appended, edited, or in any way changed or altered. In other words, a user’s changes-in either product usage or product composition will not affect the results table unless the “Calculate” function is activated. By having KETBase calculate on command, the data entry process is made significantly faster since the software does not recalculate after every edit.

### 9.1 Emission Estimation Techniques

The emission estimation techniques that are used in this module usually are EPA or local air district approved methods. These methods are customized for each facility so that facility specific factors, such as those from a source test can be implemented. This module is hard coded and does not allow user access. However, if subsequent emission factors become available, these equations can be modified quickly and easily.

### 9.2 Emission Categories

An Emission Category consists of those emitting processes for which similar emission estimation techniques **can be used. For the NSRP facilities the following categories are used:**

Cat. No.	Category Description
1	Diesel combustion
2	< 10 MMBtu natural gas combustion
3	10-100 MMBtu natural gas combustion
4	Silver electroplating
5	Copper electroplating
6	Cadmium electroplating
7	Gasoline storage/dispensing
8	I Welding
9	Abrasive blast
10	Solvent degreasers
11	Coating/Painting
12	Adhesives and hand applied solvents
13	>100 MMBtu natural gas combustion

## 10.0 REPORT MODULE

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Paradox offers near limitless sorting and reporting capabilities to its users. Kleinfelder programmers have taken advantage of many of these features in preparing the KETBase report module. According to National Shipbuilding Research Program (NSRP) specification, KETBase offers six separate reports that can be written to the printer setup in the Paradox software (refer to the Paradox 4.0 manual to setup a printer).

### 10.1 Report Printing

To create a report using KETBase, a user should select the “Reports” option from the main menu. This will open a second menu box where there will be six choices: facility emissions, device emissions, emitting devices, facility product usage, device product usage, and product use devices. A detailed explanation of these individual reports is contained in Section 9.2. Use the **cursor control** and **enter** keys to choose a report. Previous to selecting a Report type, the user should select an output device using the “Destination” selection. The user can choose between sending the output to a printer, a DOS text file, or the screen. The selections are described in Section 9.2.

### 10.2 Report Selections and Output Devices

#### Report selections

Facility Emissions: This report will summarize and print the total emissions from the KETBase datafile. In other words, the emissions for the entire facility will be printed. This report will contain emissions data for every toxic that KETBase tracks. This report will be useful for facility-wide emission based permitting.

This report is accessed by choosing “Facility Emissions” after choosing the “Reports” module.

Device Emissions: This report will print the total toxic emissions for a device chosen by the user. In this way, device emission-based permitting can be facilitated.

To access this capability the user should select “Device Emissions” from the “Reports” module. After this selection KETBase will query the user for which device to print a report for. This is done by a lookup table of all the available devices. Simply use the **cursor control** keys to select the appropriate device and press F2 to print a

report. To print this report of all devices, simply choose “All” from the lookup table.

Emitting Devices:

This report will print a list of devices that emit a specific pollutant and the amounts of that pollutant which are emitted. This report is useful in identifying problematic emitting devices.

To print this report, select “Emitting Devices” from the “Reports” module. After making this selection, KETBase will ask the user which pollutant the report will be based upon. The user selects the pollutant of choice from a pollutant lookup table by using the **cursor control** and **F2** keys. To print this report for every pollutant, choose “All” from the lookup table.

Facility Product Usage:

This report will print a summary of all the products used and the amounts they are used for the facility. This report can be used to check the accuracy of the data entered in to KETBase against purchase records, usage logs, or utility logs.

To print this report, select “Facility Product Usage” from the “Reports” module.

Device Product Usage:

This report consists of product usage information for the device specified by the user.

To access this capability the user should select “Device Product Usage” from the “Reports” module. After this selection, KETBase will query the user for which device to print a report for. This is done by a lookup table of all the available devices. Simply use the **cursor control** keys to select the appropriate device and press **F2** to print a report. To print this report of all devices, simply choose “All” from the lookup table.

Product Usage Devices:

This report will print a list of devices that use a specific product and the amounts that the product is used. This report is useful in identifying problematic emitting devices.

To print this report, select “Product Usage Devices” from the “Reports” module. After making this selection, KETBase will ask the user which product the report will be based upon. The user selects the product of choice from a lookup table by using the **cursor control** and **F2** keys. To print this report for every product, choose “All” from the lookup table.

Output Devices

These choices are selected from a menu box after the main menu item, “Destination”, is selected.

**Printer:** KETBase will send the selected report to the printer selected and setup in Paradox 4.0 (refer to your Paradox 4.0 manual for detailed instructions on how to setup a printer).

To access this choice select “Printer” from the Destination menu.

**DOS File:** KETBase will write a DOS text file containing the report selected by the user. The advantages of this option is that the report will be accessible easily without wasting paper. Any text editor”can be used to view these files. We recommend the text editor, “Edit.exe” that is packaged with Microsoft DOS versions 5.0 and later.

To access this choice select” File” from the Destination menu. KETBase will always write the report to a file named “output.rpt” in the ketbase directory.

**Screen:** This option instructs KETBase to print the selected report to the screen. This is the most efficient way to quickly view a KETBase result. However, long reports may not be visible on the screen long enough for viewer appreciation.

To access this choice select “Printer” from the Output Device menu.

## 11.0 UTILITY

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The Utility Module of KETBase is accessed through the main menu choice, “Utility”. This module has one main function: to allow the user to edit the emission factors used by KETBase.. This module consists of one “screen” per emission factor. The user can view this module in Table view which will show all of the entries in a tabular fashion or use the standard Form view which allows for easier editing (use F7 to toggle between the two modes).

### 11.1 Screen Description

The screen that is used for the Utility (emission factor editing) module contains the following data

<u>Process ID:</u>	This field shows the process ID to which the displayed emission factor belongs. Do not edit this field.
CAS:	This field contains the CAS # pollutant emission factor:
<u>Emission Factor:</u>	This field contains the actual emission factor. Changing this number will affect the calculated emissions of a specific pollutant for a specific Process ID.
<u>Units:</u>	This field contains the units for the displayed emission factor. It is a static data field which has no effect on the calculations.

#### Mode

The Utility module has two modes available to the user. The default mode is the view mode. KETBase will always be in this mode, unless the user directs it to change to the edit mode. The view mode allows the user to view the information contained in the screen. The second mode is the edit mode which is accessed by pressing the “F9” key.. In this mode, a user is able to append existing data, add new data (by pressing the “insert” key), or to delete existing data (by pressing the “delete”). To save changes and to exit the edit mode, the user should press “F2” to post the entry.

#### Post (F2)

This command allows a user to post or save new entries and edits. This command can only be accessed in the “edit” mode. This command exits the “edit” mode and brings a user back to “view” mode’.

#### Exit (F8)

This command is only available in the view mode. It exits the user to the KETBase main menu.

#### Edit\_\_\_\_(F9) ‘



This command allows the user to enter the “edit” mode. Refer to the section on Modes, above for more detail.

## **11.2 Editing an Emission Factors**

To edit an existing emission factor for a Process ID the user should select “Utility” from the main menu. The user will now be in the view mode of KETBase’s Utility module. All editing must be done in the edit mode so press **F9** to enter this mode. The user can visit each successive field with and edit the appropriate entries. The cursor control keys are used to maneuver around the sheet. The lookup feature, **F1** key, is active on the Process ID and the CAS fields. The **F2** key will grab an entry from a lookup table. After all of the fields have been appended, press **F2** to post the information and return to the view mode.

## **11.3 Adding a New Emission Factor**

To add an existing emission factor to a Process ID (in other words, to force KETBase to calculate emissions of additional pollutants for a specific process type) select “Utility” from the main menu. The user will now be in the view mode of KETBase’s Utility module. From any field simply press the “insert” key to bring up an empty sheet. Simply enter the appropriate data and press **F2** to post the new record.

## **11.4 Deleting an Existing Emission Factor**

To delete an existing Emission Factory, select “Utility” from the main menu, select the appropriate record, enter the edit mode (use the **F9** key), and press the **Delete** key. KETBase will ask if you are sure you wish to delete this entry. If you answer “yes”, the record will be deleted, if you press “no” KETBase will default to the original screen.

## APPENDIX A

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TBase has three distinct security levels. These are as follows:

**SecurityLevel1:** View only. This level does not allow any editing rights. Useful for those personnel who only need to see or print emission/usage data. This level is recommended for clerical and administrative staff.

**SecurityLevel2** Edit, no emission factor edit. This level grants the user full editing rights to all modules except the emission factors. This level is recommended for knowledgeable staff who are active in the emissions tracking role.

**SecurityLevel3:** Full edit rights. This level grants the user full access and editing to all modules, including the emission factors. This level is recommended for a supervisor or manager who is knowledgeable about emissions quantification techniques. (A backup copy of KETBase should be kept in case someone with this security level accidentally corrupts the emission factor data).

The passwords for these levels are:

Security Level 1:	any text string
Security Level 2:	“Staff”
Security Level 3:	“manager”

## **APPENDIX D**

### **Legal Overview of Clean Air Act Amendments for HAPs**

## APPENDIX D

### LEGAL OVERVIEW OF CLEAN AIR ACT AMENDMENTS FOR HAPs (TITLE III) & TITLE V

#### Introduction

In 1990, Congress adopted the Clean Air Act Amendments (CAAA) which substantially expanded the provisions in the existing Clean Air Act (CAA) governing the emissions of hazardous air pollutants (HAPs) and criteria pollutants, such as volatile organic compounds (VOCs) and nitrogen oxides (NOX), that cause ozone or urban smog. The CAAA creates a complex and overlapping regulatory structure under which the United States Environmental Protection Agency (EPA) must develop emission standards and recommended emission control practices for hundreds of different industries. Generally, states must then incorporate these standards and control practices into Federal air permits (Title V permits) that apply to individual “major sources” of air pollution.

Initially this project focused on the federal regulation concerning HAPs emitted from shipyards pursuant to Title III of the CAAA, which has been codified as section 112, but was expanded to include

criteria pollutants and the potential of utilizing the data and developments of this project for Title V requirements. Typical operations at shipyards that emit regulated pollutants include coating, decreasing, electroplating, welding, and abrasive blasting. Solvents used by shipyards in coating operations emit hazardous air pollutants in the form of volatile organic compounds (VOCs). EPA is required to regulate VOC emissions from coatings used by shipyards under section 183 of the CAA as amended by the CAAA. This overview section will explain how a recently developed EPA guidance document governing the regulation of VOC emissions from shipyard coatings will serve as the basis for future HAP standards applicable to those same coatings.

Pursuant to Title V of the Act (CAAA), EPA or the authorized permitting authority must impose Federal air permits on “major sources” of regulated air pollutants, including HAPs. This section also generally explains how Title V permits will incorporate enforceable federal emission

standards and apply those standards to shipyards that are “major sources” of regulated HAPs or VOCs.

### **Federal Regulation of Hazardous Air Pollutants**

In 1970, Congress enacted section 112 of the CAA which directed EPA to list and then adopt health-based National Emission Standards for Hazardous Air Pollutants (NESHAPs) which “provide an ample margin of safety”. Between 1970 and 1990, EPA established emission standards for only the following six hazardous air pollutants: asbestos, beryllium, mercury, benzene, radionuclides and arsenic. The EPA’s inability to list and regulate additional HAPs largely stemmed from the difficulty of establishing defensible “acceptable risk” levels for carcinogens.

Congress designed Title III of the CAAA to address the prior failure of the NESHAP program by: (1) establishing a statutory list of 189 regulated HAPs to ensure the ultimate adoption of federal standards; (2) requiring EPA to initially develop technology-based emission standards (pursuant to a tight statutory time frame) on a source category basis, rather than on an individual pollutant basis; and (3) requiring EPA to conduct a subsequent “risk assessment” and to issue

more stringent health-based standards if necessary to provide “an ample margin of safety”.

### **Regulated Major Source Categories**

Section 112(c) of the CAAA requires EPA to designate and regulate industrial source categories that contain either “major sources” or “area sources” that emit any of 189 listed HAPs (Reference Appendix E). The EPA may add to the list of regulated HAPs those substances which present a threat of adverse human health effects or adverse environmental risks. The CAAA lists as regulated HAPs the following solvents which are typically used in marine coatings and their associated cleaning operations: toluene, xylene, ethyl benzene, hexane, methyl ethyl ketone (2-butanone), methyl isobutyl ketone (MIBK), and ethylene glycol compounds. The CAAA also lists “compounds” containing the following metals which could be emitted from electroplating, welding, abrasive blasting, and combustion: chromium, lead, nickel, manganese, and cadmium. The CAAA lists asbestos which is often stripped and removed by shipyards.

Section 112(a) of the CAAA defines the

term “major source” to include any stationary source or group of stationary sources located within a “contiguous area” and under “common control” that emits or has the “potential to emit” considering controls, in the aggregate, 10 tons per year or more of any listed hazardous air pollutant or 25 tons per year or more of any combination of listed HAPs. Hazardous air pollutants emissions from all sources located within a contiguous area and under common control are considered in determining whether a facility is a “major source” of HAPs. A single facility of plant may contain multiple regulated “major sources”. “Area sources” are those sources that the EPA determines still pose a significant health risk even though their emissions do not trigger the “major source” thresholds (Section 112(d) of the CAAA).

In December 1993, EPA published a final list which contained approximately 165 regulated “major sources” and 8 “area sources” of HAPs and set forth a promulgation schedule for future regulations. This schedule establishes the following regulatory dates for promulgation of technology-based standards for shipyard source categories:

(a) November 15, 1994, for the listed major source category of “surface

coatings used by shipbuilding and ship repair facilities” (under the terms of a consent agreement with the Sierra Club, EPA has agreed to propose by January 1995, and to finalize by November 1995, HAP standards for coatings used by the shipbuilding and ship repair industry); and

(b) November 15, 2000, for the listed major source categories of “industrial boilers”; “stationary internal combustion engines”; “miscellaneous metal parts and products (surface coating)”; and “polyester resins production”.

### **Mact Standards**

Section 112(d) of the CAAA requires HAP standards for “major sources” to require the “maximum achievable control technology” (MACT) taking into account compliance costs, health and environmental impacts, and energy requirements. The maximum degree of reduction in emissions can be achieved through a variety of measures, processes, methods, systems, or techniques, including design or operational changes. The CAAA specifies that the MACT standards must meet certain “floors”. The emission standards for **existing** “major sources” (a minimum

of 30 sources) must be at least as stringent as “the average emission limitation achieved by the best performing 12 percent of the existing sources” in that category.

If there are fewer than 30 sources in a major source category, the HAP emission standards must be at least as stringent as “the average emission limitation achieved by the best performing 5 sources” in that category. The MACT HAP emission standards for **new** sources must be as stringent as the emission control that is achieved by the “best controlled similar source”. EPA may elect to promulgate alternative standards for “area sources” that provide for the use of “generally available control technologies” or management practices in lieu of MACT.

The individual pieces of equipment, process, production units, or emission points that will be subject to HAP regulation will be defined and determined in the individual regulations establishing applicable MACT standards. Existing sources are required to be in compliance with the standards as expeditiously as practicable, but not later than three years after promulgation of the standards. The permitting authority may grant an additional one year extension if such an extension is necessary to install controls. Any source

which voluntarily reduces emissions of a listed substance by 90 percent from emission levels in a base year not earlier than calendar year 1987 may be subject to alternative limits in lieu of MACT controls for up to six years after the MACT compliance date. This reduction may be measured from emissions data reported on the calendar year 1987 Forms R submitted pursuant to section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA)).

As of May 1994, the Emission Standards Division in EPA’s Office of Air Quality Planning and Standards has nearly completed the MACT analysis required by section 112(d) of the CAAA for the listed major source of “shipbuilding and ship repair (surface coating)”. However, EPA currently lacks an approved test method to measure individual HAP concentrations emitted from these coatings. EPA also has not developed “unit risk” factors for most of the HAPs that are emitted from these coatings. Emission standards are set forth and explained in EPA’s Alternative Control Techniques (ACT) document and are expressed as allowable levels of total volatile organic compounds (VOCS) per gallon of coating as applied and vary depending on the different types of coat-

ing categories.

As of May 1994, EPA expects that the MACT HAP standards for coatings would simply limit the total allowed VOC content in coatings used by shipyards and would not require shipyards to install or operate any additional controls or management practices. EPA technical staff expects the preamble to the MACT/HAP coating rule will discuss the feasibility, cost and effectiveness of various add-on controls for both spray booths and tank painting operations in an analogous manner to the attached ACT. However, at this time, EPA staff expects that the burden of complying with the MACT standards for coatings would primarily fall on the commercial manufacturers of these coatings. EPA's Office of the General Counsel is currently reviewing the recommended MACT approach to determine whether it is consistent with section 112(d) of the CAAA. If the General Counsel does not approve of this approach, EPA may be required to develop emission limits or content limitations of operational standards for individual HAPs emitted from shipyard coating operations.

### **Health-Based Standards**

By November 15, 1996, EPA must report to Congress and recommend legislation

to address the residual health risk still remaining from sources subject to technology-based standards. If Congress does not act on EPA's recommendation, EPA is required to issue stricter health-based standards eight years after the initial promulgation of the MACT standards if stricter standards are necessary in order to provide "an ample margin of safety to protect the public health" and the environment. EPA must impose more stringent health-based standards on sources which emit toxic pollutants which may pose a cancer risk of greater than one-in-one million to the "at risk" individual.

However, EPA is not required to establish standards that will reduce risks to all exposed individuals to below one-in-one million. The CAAA generally preserves the EPA's prior interpretation of an ample margin of safety standard with recognized a safe threshold level of one-in-ten thousand. Sources would generally have to comply with residual risk standards within 90 days of their promulgation unless the EPA Administrator granted a waiver based on a demonstrated need to install additional controls.

### **Failure of EPA to Promulgate a Standard**



Section 112(j) sets forth specific “hammer” provisions that are automatically triggered if EPA misses a MACT promulgation date for a listed category of major sources by more than 18 months. If EPA misses the MACT deadline for a listed category, then 18 months after the scheduled MACT promulgation date, the owner or operator of a “major source” in that category must file either a new or revised permit application (Refer to discussion below). The permitting authority must then determine on a case-by-case basis a standard that is equivalent to the MACT standard that the EPA should have promulgated. This MACT equivalent emission standard must be incorporated along with the other mandated requirements of Title V into the permit.

Under a court order, EPA must promulgate, by November 1995, MACT standards for coatings used by shipyards. As long as EPA complies with that order, shipyards will not have to incur the substantial additional expense associated with filing a permit application for a case-by-case MACT determination for coatings under section 112(j).

#### **New Construction or Modification**

After the effective date of any emission standard or regulation, no person may

construct any new “major source” or modify any existing “major source” unless the permitting authority determines that the new source will comply with the applicable MACT standard (Section 112(j) of the CAAA). After a state has adopted an EPA-approved air toxics permit program pursuant to Title V of the CAAA, no person may construct any new “major source” in that state or modify any existing “major source” unless the permitting authority determines that the newly constructed or modified source will comply with the applicable MACT standards (Section 112(g) of the CAAA). After the effective date of a state permit program, no person may modify a “major source” of toxic air pollutants unless the permitting authority determines that the applicable MACT standard for existing sources will be met. A physical change of a “major source” which results in a greater than a **de minimis** increase in actual emissions of a HAP is deemed a “modification” unless such an increase is offset by an equal or greater decrease in the amount of emissions of other more hazardous pollutants.

The permitting authority must make a case-by-case MACT determination for “major sources” under section 112(g) of the CAAA if the EPA has not established an applicable federal MACT standard.

We expect that the states may have to make a MACT determination for certain operations at shipyards that emit regulated toxic air pollutants above “major source” thresholds, but have not been identified by the EPA as a “major source” or an “area source” category. In other words, EPA’s list of “major source” categories may not include all “major sources” of toxic air pollutants. In the absence of applicable federal MACT standards, individual “major sources” will have to obtain a MACT determination from its individual permitting authority.

### **Sudden Accidental Releases**

The CAAA also establishes a new program to prevent or provide effective responses to sudden, accidental release of extremely hazardous substances. EPA may require that such plans be reviewed by an independent authority and that deficiencies be identified and corrected. These plans must be submitted to EPA, the Chemical Safety and Hazardous Investigation Board, and the appropriate state and local agencies.

### **Volatile Organic Compounds**

Approximately 30 states that contain metropolitan areas that have failed to attain the ambient air quality level for

ozone must submit State Implementation Plans (SIPS) that demonstrate those states will attain the ozone standard in a timely manner. The CAAA requires those states to impose reasonably available control technology (RACT) requirements on “major sources” of volatile organic compounds (VOCS). The threshold “major source” levels depends on the severity of ozone pollution in a particular air basin.

All ozone nonattainment areas are classified as either “marginal”, “moderate”, “serious”, “severe”, or “extreme”. (To obtain the most up-to-date list of non-attainment states, shipyards are advised to contact their state regulatory agency.) “Major source” threshold levels vary from sources that have the potential to emit of at least 10 tons of VOCs in “extreme” non-attainment areas to sources that have the potential to emit 1 00 tons of VOCs in marginal “nonattainment” areas.

The CAAA required EPA to establish by November 1993, control techniques guidelines (CTGS) to reduce the emissions of volatile organic compounds (-VOCS) and PM-10 from coatings and solvents used in shipbuilding and repair operations (Section 183(b)(4) of the CAAA). These CTGS must identify “best available control measures” (BACM) for the industry. EPA interprets BACM as

being roughly equivalent to RACT.

Because of severe budget constraints, EPA issued in April 1994 an alternative control techniques or ACT guidance document instead of the statutorily mandated CTG for the shipbuilding and repair industry. EPA decided that it could issue this ACT in a more expeditious and less costly manner than a CTG to provide states with immediate regulatory guidance. The differences between an ACT and a CTG are there following:

1. ACTS simply discuss various emission reduction or control options, whereas CTGs identify and recommend a particular practice as RACT based on a comprehensive cost/benefit analysis;
2. ACTS are discretionary federal guidance to the states whereas CTGS serve as mandated federal controls on "major sources"; and
3. Unlike CTGS, ACTS are not subject to any notice and comment process.

The ACT for surface coating operations at shipyards includes the VOC content limits set forth in the regulations of several major California air districts. The ACT

also addresses both costs and the effectiveness of both VOC and PM-10 control options. States permitting authorities could also rely on this ACT as serving as the basis for any RACT and/or MACT determinations that they may have to make for shipyards that are "major sources" of either VOCs or hazardous air pollutants.

### **Federal Air Permits**

Under section 502(d), all states were required to develop and submit by November 15, 1993, a proposed federal air permit program that contained at a minimum specific provisions mandated by EPA pursuant to Title V of the CAAA. However, as of March 1994, only about half of the States had submitted a complete Title V permitting program. States face stiff sanctions if they fail to file a complete proposed Title V permit program by May 1995. Within one year of receiving a state's proposed permit program, EPA must approve or disapprove such a program. By the end of 1994, most states should have obtained EPA approval and begun implementing effective Title V permit programs. Section 502(d)(3) requires EPA to begin administering permit programs in all those states that still do not have EPA approved by November 15, 1995. Facilities desig-

nated as a “major source” (including those that emit regulated HAPs or VOCs) will have to submit a comprehensive permit application within 12 months of becoming subject to an EPA authorized permit program (i.e., generally sometime in late 1995 or early 1996).

Facilities may be able to enter into enforceable commitments to the “potential to emit” to below “major source” thresholds so they can avoid the Title V permitting requirements. These permit applications will have to quantify the emissions of all regulated air pollutants emitted from a “major source” facility and identify all applicable emission standards. As discussed in previous sections, permit applicants may have to submit information to the permitting authority which documents the appropriate MACT level for those “major sources” of HAPs for which the EPA has failed to establish federal standards. Within eighteen months of receiving a permit application, the permitting authority must issue a permit that either established on a case-by-case basis and/or incorporates all the applicable emission standards for regulated air pollutants. Each Title V permit must contain sufficient testing, monitoring, reporting and recordkeeping requirements to ensure that the applicable emission limitations are federally enforceable. Perm-

itees will then have to certify that their facilities are in compliance with the terms in their permit on a continuous basis.

# **APPENDIX E**

## **List of Hazardous Air Pollutants**

## APPENDIX E

### List of Hazardous Air Pollutants

CAS number	Chemical name
75070	Acetaldehyde
60355	Acetamide
75058	Acetonitrile
98862	Acetophenone
53963	2-Acetylaminofluorene
107028	Acrolein
79061	Acrylamide
79107	Acrylic acid
107131	Acrylonitrile
107051	Allyl chloride
92671	4-Aminobiphenyl
62533	Aniline
90040	o-Anisidine
1332214	Asbestos
71432	Benzene (including benzene from gasoline)
92875	Benzidine
98077	Benzotrichloride
100447	Benzyl chloride
92524	Biphenyl
117817	Bis(2-ethylhexyl)phthalate(DEHP)
542881	Bis(chloromethyl)ether
75252	Bromoform
106990	1,3-Butadiene

<b>CAS number</b>	<b>Chemical Name</b>
156627	Calcium Cyanamide
105602	Caprolactam
133062	Captan
63252	Carbaryl
75150	Carbon disulfide
56235	Carbon Tetrachloride
463581	Carbonyl sulfide
120809	Catechol
133904	Chloramben
57749	Chlordane
7782505	Chlorine
79118	Chloroacetic acid
532274	2-Chloroacetophenone
108907	Chlorobenzene
510156	Chlorobenzilate
67663	Chloroform
107302	Chloromethyl methyl ether
126998	Chloroprene
1319773	Cresols/Cresylic acid (isomers and mixture)
95287	o-Cresol
108394	m-Cresol
106445	p-Cresol
98828	Cumene
94757	2,4-D, salts and esters
3547044	DDE
334883	Diazomethane

<b>CAS number</b>	<b>Chemical name</b>
132649	Dibenzofurans
96128	1,2-Diromo-3-chloropropane
84742	Dibutylphthalate
106467	1,4-Dichlorobenzene(p)
91941	3,3-Dichlorobenzidene
111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)
542756	1,3-Dichloropropene
62737	Dichlorvos
111422	Diethanolamine
121697	N, N-Diethyl aniline (N, N-Dimethylaniline)
64675	Diethyl sulfate
119904	3,3-Dimethoxybenzidine
60117	Dimethyl aminoazobenzene
119937	3,3'-Dimethyl benzidine
79447	Dimethyl carbamoyl chloride
68122	Dimethyl formamide
57147	1,1-Dimethyl hydrazine
131113	Dimethyl phthalate
77781	Dimethyl sulfate
534521	4,6-Dinitro-o-cresol, and salts
51285	2,4-Dinitrophenol
121142	2,4-Dinitrotoluene
123911	1,4-Dioxane(1,4-Diethyleneoxide)
122667	1,2-Diphenylhydrazine



<b>CAS number</b>	<b>Chemical name</b>
106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)
106887	1,2-Epoxybutane
140885	Ethyl acrylate
100414	Ethyl benzene
51796	Ethyl carbamate (Urethane)
75003	Ethyl chloride (Chloroethane)
106934	Ethylene dibromide (Dibromoethane)
107062	Ethylene dichloride (1,2-Dichloroethane)
107211	Ethylene glycol
151564	Ethylene imine (Aziridine)
75218	Ethylene oxide
96457	Ethylene thiourea
75343	Ethylidene dichloride (1,1-Dichloroethane)
50000	Formaldehyde
76448	Heptachlor
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
77474	Hexachlorocyclopentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-Diisocyanate
680319	Hexamethylphosphoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid
7664393	Hydrogen fluoride (Hydrofluoric acid)
123319	Hydroquinone

<b>CAS number</b>	<b>Chemical name</b>
78591	isophorone
58899	Lindane (all isomers)
108316	Maleic anhydride
67561	Methanol
72435	Methoxychlor
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)
71556	Methyl chloroform (1,1,1-Trichloroethane)
78933	Methyl ethyl Ketone (2-Butanone)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)
108101	Methyl isobutyl ketone (Hexone)
624839	Methyl isocyanate
80626	Methyl methacrylate
1634044	Methyl tert butyl ether
101144	4,4-Methylene bis(2-chloroaniline)
75092	Methylene chloride (Dichloromethane)
101688	Methylene diphenyl diisocyanate (MDI)
101779	4,4'-Methylenedianiline
91203	Naphthalene
98953	Nitrobenzene
92933	4-Nitrobiphenyl
100027	4-Nitrophenol
79469	2-Nitropropane
684935	N-Nitroso-N-methylurea
62759	N-Nitrosodimethylamine

<b>CAS number</b>	<b>Chemical name</b>
59892	N-Nitrosomorpholine
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol
108952	Phenol
106503	p-Phenylenediamine
75445	Phosgene
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polychlorinated biphenyls (Aroclors)
1120714	1,3-Propane sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur (Baygon)
78875	Propylene dichloride (1,2-Dichloropropane)
75569	Propylene oxide
75558	1,2-Propylenimine (2-Methyl aziridine)
91225	Quinoline
106514	Quinone
100425	Styrene
96093	Styrene oxide
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin
79345	1,1,2,2-Tetrachloroethane

<b>CAS number</b>	<b>Chemical name</b>
127184	Tetrachloroethylene (Perchloroethylene)
7550450	Titanium tetrachloride
108883	Toluene
95807	2,4-Toluene diamine
584849	2,4-Toluene diisocyanate
95534	O-Toluidine
8001352	Toxaphene (chlorinated camphene)
120821	1,2,4-Trichlorobenzene
79005	1,1,2-Trichloroethane
79016	Trichloroethylene
95954	2,4,5-Trichlorophenol
88062	2,4,6-Trichlorophenol
121448	Triethylamine
1582098	Trifluralin
540841	2,2,4-Trimethylpentane
108054	Vinyl acetate
593602	Vinyl bromide
75014	Vinyl chloride
75354	Vinylidene chloride (1,1-Dichloroethylene)
1330207	Xylenes (isomers and mixture)
95476	o-Xylenes
108383	m-Xylenes
106423	p-Xylenes
o	Antimony Compounds

CAS number	Chemical name
0	Arsenic Compounds (inorganic including arsine)
0	Beryllium Compounds
0	Cadmium Compounds
0	Chromium Compounds
0	Cobalt Compounds
0	Coke Oven Emissions
0	Cyanide Compounds <sup>1</sup>
0	Glycol ethers <sup>2</sup>
0	Lead Compounds
0	Manganese Compounds
0	Mercury Compounds
0	Fine mineral fibers <sup>3</sup>
0	Nickel Compounds
0	<b>Polycyclic Organic Matter<sup>4</sup></b>
0	Radionuclides (including radon) <sup>5</sup>
0	Selenium Compounds

Note For all listings above that contain the word "compounds" and for glycol ethers., the following applies Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.

<sup>1</sup>X'CN where X = H' or any other group where a formal dissociation may occur. For example KCN or Ca(CN)<sub>2</sub>

<sup>2</sup>Includes mono and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol R- (OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OR' where n=1,2 or 3  
R= alkyl or aryl groups  
R = R,H, or groups that, when removed, yield glycol ethers with the structure:  
R- (OCH<sub>2</sub>CH)<sub>n</sub> -OH. Polymers are excluded from the glycol category.

<sup>3</sup>Includes mineral fiber emissions from facilities manufacturing or processing glass, rock or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

<sup>4</sup>Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100.c.

<sup>5</sup>A type of atom that spontaneously undergoes radioactive decay.

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• *Overall Quality of Report*

☐ Excellent ☐ Good ☐ Fair ☐ Poor

• *Usefulness to You/Your Organization*

☐ Very Useful ☐ Moderately Useful ☐ N/A

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